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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Spider and Prey

See Page 68

A SCIENCE SERVICE PUBLICATION

NUTRITION

Radiation for Better Food

Drying and curing were the sole methods for preserving food before the advent of refrigeration and canning. Now radiation promises to help in the preservation of food.

➤ SECOND ONLY to the actual growing of food crops, the health of the world depends on how well these foods can be processed to preserve them from spoiling after they are harvested. Food processing of one kind or another has been used for thousands of years but now it can be depended upon to keep foods wholesome and nutritious for months or even years.

The atomic age has brought in two new developments which promise to make great contributions to food preservation.

The first is the use of antibiotics to slow down the growth of the microbes in processed food. These microbes ultimately cause food to spoil. The antibiotics have limited uses at the present, but at least one of them, Aureomycin, is used on poultry or fish. They are still very much in the development stage and health authorities are naturally cautious about them until their effects are better understood.

One reason that their value may be limited is that resistant strains of the microbes may be produced over a period of time, causing the antibiotics to lose their preservative value.

Perhaps a more significant development in food processing is the use of radiation to preserve food, Dr. W. H. Cook, director of the division of applied biology, National Research Laboratories, Ottawa, Canada, suggests.

Gamma, beta and X-rays from atomic reactors and electron generators are able to kill microbes and can sterilize foods without heating or partially cooking them, as the canning process does. Naturally, the foods would still have to be kept in sealed containers so that no more bacteria could get to them.

Some foods develop unpleasant flavors when sterilized with high doses of radiation, but these sometimes can be overcome by irradiating at low temperatures or by adding acceptable chemicals that prevent the flavors from developing.

Low doses of radiation, although not able to sterilize completely the food, also have certain advantages for processing some foods.

Potatoes and onions can be kept from sprouting, and at least some of the bacteria on meat can be killed with these low doses. For meat processing, low doses of radiation may become a valuable supplement to the refrigeration techniques already in use.

Today, the two most widely used preservation methods are canning and refrigeration, which are supplemented by the drying and curing methods that have been practiced for centuries. Canned foods retain their value for years, but the food is necessarily cooked. Quick freezing, on the other hand, provides a fresh, ready to cook product, but requires special facilities for maintaining low temperatures during processing, transportation and storage.

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TECHNOLOGY

USSR A-Power Hits Snags

➤ RUSSIAN ATOMIC power developers are both looking to and looking like their American counterparts, W. Kenneth Davis, director of the Atomic Energy Commission's division of reactor development, has revealed.

Mr. Davis made his peaceful atomic comment before the Midwest Regional Conference of the Council of State Governments meeting in Cleveland, Ohio.

Discussing the Russian effort, he said an interesting feature of the Soviet power reactor program "is that it looks more and more like the U. S. program.

"It now appears that the Russians are lagging in technology and may hope to obtain guidance through U. S. advances which, of course, are available throughout the world. It is also significant to note that their judgment has not led them to other types of reactors or to greater emphasis on natural uranium for power reactors."

The AEC expert pointed out that the Reds' proposed pressurized water reactor is "remarkably similar" to the PWR we are building at Shippingport, Pa.

Mr. Davis also noted that from recently received information it is estimated that the Russians will have a total capacity not much over 1,000,000 electrical kilowatts from their planned plants. This, he said, is a far cry from the 2,500,000 kw they were boasting about a year ago.

The Russians, Mr. Davis said, have probably come face to face with the realities involved in a nuclear reactor program, where even the simplest of nuclear power plants can present formidable technical difficulties.

Soviet planners who boasted last year, Mr. Davis commented, were "naive" about their own program.

He cautioned the audience that one should not become complacent about the nuclear activities of the Russians, or in any other field. A rational estimate of their capabilities is likely to be correct in the long run. "However," he concluded, "we would be silly indeed to let unsupported and irrational claims as to their capabilities distort and warp sound United States policies and programs."

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PHYSICS

Atomic Scintillation Subject of Conference

➤ ONE OF the methods of detecting atomic and other radiation, liquid scintillators, will be discussed at a conference Aug. 20 to 22 at the Technological Institute of Northwestern University, Evanston, Ill.

The theory and application of this type of apparatus will be covered at the conference, including coincidence counters, single channel counters, chemistry of liquid scintillators, and applications to biology and medicine, industry, archaeology, physics, chemistry and engineering.

Dr. F. Newton Hayes of Los Alamos, N. M., has been in charge of organizing the program.

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ENGINEERING

Engineer Defends English A-Power Plan

➤ THE BOTTLENECK to England's dream of becoming a great nuclear power is a shortage of scientific manpower, W. R. Wootton of Babcock & Wilcox, Ltd., London, told the American Society of Mechanical Engineers meeting in San Francisco.

A shortage of technical knowledge, as has been suggested, is not the roadblock to England's ambitious plans for creating a gigantic nuclear power industry over the next two decades.

Defending England's atomic energy program against American criticism, the English engineer denied the atomic power stations in his country are inefficient and becoming obsolete. The British program, he emphasized, "is by no means a stop-gap adopted by a country with a dire shortage of coal and oil."

The English, he charged, know what they are doing. Again defending his nation's program against its American critics, Mr. Wootton pointed out the current British nuclear plants will still be built 25 years from now. Calder Hall, where a power reactor is now in operation, has advantages of simplicity and safety not found in more advanced types of reactors. British industry is sticking to this type of reactor, he added.

Some American atomic power experts have criticized the British for racing into the utilization of peacetime nuclear power and held that our policy of slow, cautious development is the right road. They point out that although nuclear power may be economically practical for England, we do not know enough about it to justify a rapid development program in the United States.

Mr. Wootton re-emphasized the shortage of trained engineers and scientists in England as the "most serious obstacle" in the path to atomic power.

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CHEMISTRY

Make Sun-Hot Flames

Flames that are only some 800 degrees absolute cooler than those on the sun's surface are being produced in the laboratory today from an ozone and cyanogen mixture.

➤ MAN-MADE flames almost as hot as the sun's surface have been achieved by chemical means, an American chemist reported.

The super-hot flames are not mere laboratory curiosities, but are being used in practical testing of high-temperature materials, and some of the super flames will soon be put to practical uses outside the laboratory.

Dr. A. V. Grosse of the Research Institute of Temple University, Philadelphia, described to the 16th International Congress of Pure and Applied Chemistry meeting in Paris, France, flames that have consistently reached temperatures of 8,500 degrees Fahrenheit, or 5,260 degrees on the Absolute scale. The temperature of the sun's surface is approximately 6,000 degrees absolute. Dr. Grosse also predicted the production soon of temperatures of nearly 9,500 degrees Fahrenheit, almost twice the reaction temperature in newer jet engines and over three times the temperature of a blast furnace.

The key to the ultra-high temperatures is in the use of ozone, rather than normal oxygen, in burning hydrogen, cyanogen and other gases. Ozone is an allotropic form of oxygen which occurs in small amounts naturally, but is readily available from commercial suppliers.

A colleague of Dr. Grosse, Dr. A. G. Streng, told SCIENCE SERVICE the hottest flames were produced from ozone-cyanogen mixtures. However, he said, other mixtures producing slightly lower temperatures are more practical.

Charles S. Stokes, a cyanogen flame research chemist and another associate of Dr. Grosse, explained that the cyanogen-oxygen flames, producing temperatures of about 7,700 degrees Fahrenheit, are valuable tools in research on ceramics and other high-temperature materials.

"These flames already are practical outside the laboratory and we have been producing them in large quantities," he said.

The hotter cyanogen-ozone flames, Mr. Stokes said, soon will be practical, routine laboratory tools.

Chemical Jackpot

➤ A HUGE JACKPOT of undiscovered chemical compounds formed at high temperature offers solutions to the problems of modern technology.

This was the suggestion of Dr. Leo Brewer, a University of California chemist, at the chemists' International Congress.

Dr. Brewer said chemists would come up with many new compounds to help solve the problems of jet aircraft and rockets, atomic energy power plants, space flight and new industrial processes of many kinds.

Materials to withstand tremendous heat are one of the prime needs of the new age.

The reason for relatively slow progress so far is the primitive state of knowledge concerning chemical reactions in the high temperature region of 2,000 to 3,000 degrees centigrade, or from 3,600 to 5,400 degrees Fahrenheit.

The state of knowledge is comparable to that of chemistry at ordinary temperatures a century ago when chemists were trying to learn if water were composed of one atom of hydrogen and one of oxygen, or two hydrogen atoms and one oxygen.

Despite recent work, misconceptions of

TECHNOLOGY

Luminescent Panels Made

➤ MOTION PICTURES, "erasable" images and movable "pips" have been produced on luminescent panels as flat as a painting and no thicker than a sandwich, it has been announced by Frank J. Healy, vice president in charge of Sylvania Electric Products' lighting operations.

The panels work on two basic principles: "electroluminescence," or making special phosphors glow by exciting them with an alternating electric current field, and "photo-conductivity," a physical property of some substances that allows them to carry an electric current only when light shines on them.

Three types of the "Sylvatron," or image-producing panels, have been developed. One panel makes it possible to move a little dot of light around electrically.

To do this, a layer of electroluminescent phosphor, which might glow any color, is sandwiched between a fine horizontal "grid" of electrically conducting strips only 1/64 inch wide and a similar grid of vertical strips. When electricity is applied to a horizontal and vertical strip, the little "square" between them glows brilliantly. In a two-inch square, 1,024 of these "squares" can be individually lighted.

The second type of panel can not only produce but "store" images for either fractions of a second or hours, if desired. Hundreds of tiny "columns" 1/32 inch square, cemented on electrically conducting glass, combined with electroluminescent and photo-conducting layers, can be individually "triggered" by a spot of light beamed on them. The light image that forms is itself in contact with the photo-conducting layer, and so keeps itself "turned on" until it is erased.

The third type uses one layer each of electroluminescent phosphor, a photo-conductive layer and an electrically conducting layer to turn an ordinary light image focused on the panel into an image made up of thousands of tiny "dots" on the front of the panel. The device can also change infrared light into blue or green light.

The panels can be used as a combination of the types, and have been produced in two-inch and four-inch sizes, but the size is limited only by the size of the production machinery. Development of the panels was at the General Engineering Laboratory of Sylvania's Lighting Division. Part of the work was carried on in cooperation with Lincoln Laboratories of the Massachusetts Institute of Technology.

While the device is still in the laboratory stage, it is considered advanced enough for development and application by electronics and defense laboratories and under military contracts.

As for television, the panels will not be used "in the foreseeable future," Mr. Healy declared, since they are to be restricted right now to military or special commercial uses.

SYLVATRON—An image-producing panel is shown being put through laboratory tests by Dr. Keith Butler, manager of the general engineering laboratories of Sylvania's lighting division, Salem, Mass., where the Sylvatron was developed. The unit can convert electrical data into simultaneous dots of light, thus reproducing pictures in motion as shown in the photograph.

what happens at high temperature are still widely held.

The scientist explained that when heat is applied to compounds at ordinary temperatures, the compounds begin to come apart. This leads to the widespread assumption that as things get hotter, the species of molecules get simpler.

"This is not true," Dr. Brewer said, "and in many types of systems one finds quite complex molecules even at very high temperature."

What happens is that as temperatures increase, compounds important at room temperature are converted to new compounds that are usually different. The compounds that predominate at high temperature are unexpected and unpredictable by ordinary chemical rules.

Moreover, compounds are stable at these very high temperatures when they could not even exist at ordinary temperatures.

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ENTOMOLOGY

Garden Spider Snares Herself an Insect Dinner

See Front Cover

➤ THE YELLOW-BANDED garden spider shown on the cover of this week's SCIENCE NEWS LETTER has successfully snared herself a fine dinner—perhaps a grasshopper which is a favorite food.

The spider belongs to the subfamily *Argiopinae*, a group of handsome orb web weavers second only to the silk spiders in size. Its technical name is *Argiope aurantia*. The name describes the spider's coloring very appropriately: it is marked with bright yellow or orange spots on a mostly black body.

Large webs, often two feet in diameter, are placed upon shrubs along roadsides, in gardens and around houses.

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MEDICINE

Antibiotics Aid Disease

➤ A FATAL FUNGUS disease that usually kills within ten days is apparently increasing due to the widespread use of antibiotics, Dr. C. G. Tedeschi, department of pathology of the Veterans Administration Hospital in Boston, Mass., told SCIENCE SERVICE.

The disease is known as mucormycosis and is caused by a fungus found in moldy bread and other contaminated food. It attacks both animals and man, Dr. Tedeschi said.

The disease is never found existing by itself, but always as a complication of other debilitating conditions such as diabetes, leukemia, severe burns and infections. It gets its start after antibiotic treatment has killed the bacteria that usually compete with the fungus for food.

In healthy individuals the body's defense mechanisms are enough to protect against the fungus. However, when general resistance is extremely low, the fungus invades the blood stream and travels through the entire body, closing off blood vessels and ending quickly in death.

The disease was first reported in the U. S. in 1943, although it had been known in Europe for about 75 years. Now there have been about 12 reported cases in this country, the majority from the South and Midwest. The total number is too small, however, to show any significant geographical or environmental factors.

There is no known drug cure for the disease.

Since 1949 nearly every antibiotic or combination of antibiotics has been tried as a cure, all with no success. Age, sex and race give no clues as to what causes the condition, and children are affected as well as adults. But in every case reported so far there has been a history of a debilitating condition.

Antibiotics cannot be reduced in many of these cases because they are usually necessary to sustain life, but physicians should be aware that their continued use may bring on mucormycosis, the pathologist emphasized.

Fortunately, he said, the disease occurs only rarely and the doctor may have to run the risk of causing its outbreak when he uses antibiotics.

A case of cerebral mucormycosis is reported by Dr. Tedeschi and Dr. J. C. Merriam Jr., also of the VA hospital, in *Neurology* (July).

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TEXTILES

Scientists Make Cotton A "Miracle" Fiber

➤ COTTON, at the hands of U. S. Department of Agriculture scientists, is turning out to be as much of a miracle fiber as any coming from the test tube.

Oil simply rolls off the new cottons that have been treated by a "proofing" process at the USDA's research laboratories in New Orleans, La. Scientists there have developed fluorochemical processes that effectively waterproof and oilproof cotton fabrics. Treated fabrics, they report, refuse to soak up moisture. Water drops stay on the surface until they evaporate.

Fully acetylated cotton is another treated cotton that combines the textile's good natural qualities with some desirable synthetic qualities.

FA cotton, as it is called, looks very much like untreated cotton but it is unaffected by acetic acid, acetone, aniline and dioxane, solvents that dissolve some of the synthetic fibers.

It dries faster than untreated cotton and can be ironed with a warm iron. After laundering, pleats may be easily re-pressed or the garment ironed flat and new pleats pressed in.

The cotton, unlike some synthetics, can be dyed a full range of shades and colors.

For industrial uses, such as electrical insulation material, power-transmission belts, conveyor belts, and those requiring exposure to varying conditions of atmospheric moisture, fully acetylated cotton may be the ideal fabric. (See p. 70.)

Experiments have shown that it is very strong with little "give." It is also highly resistant to heat and rot and has good dimensional stability.

The new treated cottons are still in the laboratory stage, with scientists working to perfect their home-grown miracle fiber, but the experimental cottons look promising for home use and industry.

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PUBLIC HEALTH

AMA Plans No Tar Studies

Smokers may be getting more tar in their smoke than some reports indicate. The best type of filter was another cigarette, the AMA found in earlier research.

➤ THE AMERICAN Medical Association has no information on the tar in cigarettes sold since 1954, Dr. Walter Wolman, director of the AMA's chemical laboratory, Chicago, has told a House Government Operations subcommittee investigating filtered cigarettes.

Their earlier studies were made during 1952, 1953 and 1954 and were begun because of an Association controversy over carrying cigarette advertising in the official *Journal of the American Medical Association*. As a result of the research, cigarette ads have not appeared in the journal since then.

The AMA plans no further studies of cigarettes at the present time, although they might do more research if asked by the subcommittee, a spokesman for the medical group told SCIENCE SERVICE.

Tobacco actually did appear to be "its own best filter" in the AMA research. A study of cigarette holders that contained filters showed that the best one used an inserted cigarette as a filter. It reduced the nicotine and tar content by about 41%, Dr. Wolman said.

Smokers are actually getting more tar in their smoke than earlier published reports have indicated. Cyril S. Kimball, executive vice president of Foster D. Snell, Inc., New York, consulting chemists, told the subcommittee.

Chloroform is being used to dissolve and extract the so-called tars in the smoke but only about 70% of the total tar content will dissolve in it, he said.

This results in a tar measurement that is significantly lower than it actually is. The main problem now is that there is no standardized definition of cigarette tar that is accepted by all researchers, he added.

CO May Cause Cancer

➤ THE DEADLY GAS, carbon monoxide, should be studied as a possible cause of lung cancer in cigarette smokers, Dr. E. Cuyler Hammond, American Cancer Society, told the House subcommittee.

So far, only the so-called neutral fractions of tobacco smoke have been studied as possible carcinogens. Two of the most potent elements of smoke, nicotine and carbon monoxide, have not received the same attention, Dr. Hammond said.

The main reason they have not is their highly poisonous nature. Even tiny quantities of nicotine and carbon monoxide can quickly overcome the research animals used to study the other substances found in tobacco smoke.

Carbon monoxide is believed by some researchers to be carcinogenic because it restricts complete oxidation in body tissue. Airborne carbon monoxide comes from automobile exhausts, factory chimneys, and other sources of exhaust gases.

The gas is formed during the burning process and is the result of incomplete combustion such as that found in a smoldering cigarette. Although the actual amount in the smoke of any one cigarette may be extremely small, it may have an additive effect with other amounts found in the air, Dr. Hammond said.

But carbon monoxide can certainly not be considered the cause of cancer at this time, he emphasized.

"I am merely suggesting that its effects should be more fully studied," he said.

Asked whether the American Cancer Society's recent study of smokers and lung cancer showed that any one brand of filters was safer than others, Dr. Hammond replied it was impossible to tell.

When the questionnaire study was started in 1951, few filter cigarettes were on the market, so a question about filters was not included. By the end of the study in 1955, filters were quite popular and a question about them was included in the survey. Results showed that 28% of regular smokers were using them then, Dr. Hammond said.

People are now switching back and forth between various filters too often to get any reliable information about which one might be better, he added.

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METEOROLOGY

Weather Bureau Predicts Hurricane Tides

➤ A TEAM of Weather Bureau meteorologists has worked out an experimental method for forecasting the maximum storm tide due to hurricanes and other tropical storms.

The method was tried on Hurricane Audrey and was accurate to within two feet of the actual tidal surge that inundated Lake Charles, La. Using the method, Bureau forecasters put the tidal surge to occur at nine feet. Actually, the tide measured approximately ten and one-half feet in height. (See SNL, July 27, p. 63.)

Making a cautious evaluation of the method and the results from Hurricane Audrey, D. Lee Harris, one of the method's developers, told SCIENCE SERVICE that it is only a "first step" in evolving a more accurate means for predicting the heights of tide surges following a storm. He cautioned that the results of predicting the Audrey surge were "exceptionally good" but could not be expected to be duplicated for every future hurricane.

The method forecasts only the expected height of the still water level, or storm surge. It does not account for the smaller waves that ride the crest of the tide and are responsible for wide destruction of property and erosion.

To evolve the method, the researchers had to set up a simple storm situation, from which they could derive a basic equation. This included data collected from previous hurricanes. In the equation for the Gulf of Mexico, they used 30 hurricanes that occurred from October, 1893, through September, 1950.

Mr. Harris pointed out that it is impossible for local forecast centers to have all the facts needed to predict a tidal surge following on the heels of a hurricane, but that the equation can account for 50% of the needed information.

The method is reported in the Weather Bureau's *Monthly Weather Review* by Mr. Harris of the U. S. Weather Bureau, Washington, and W. C. Conner and R. H. Kraft of the Weather Bureau Office, New Orleans, La.

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MEDICINE

Brain Injection Helps Cerebral Palsy Victims

➤ CEREBRAL PALSY victims may be helped by a new brain operation that relieves their involuntary muscular movements. The surgical technique, called chemopallidectomy, involves an injection of chemicals deep into the brain and has been used in the past to help adult victims of Parkinson's disease.

Out of 30 children who have had the surgery, 20 of them were either cured of their involuntary movements or were noticeably helped, Dr. Irving S. Cooper, New York University-Bellevue Medical Center, New York, reports in the *Journal of the American Medical Association* (July 20).

The chemicals are injected into the region of the globus pallidus, in the lower middle part of the brain. They destroy tissue which is believed to cause the abnormal stimulation of the muscles.

But the value of the treatment lies in the fact that both sensation and the ability to move are not lost along with the involuntary movements.

Why the operation helps to relieve the tremor, rigidity and involuntary motion is not known and requires much more study, Dr. Cooper reports.

He emphasizes that the treatment was only helpful in eliminating the involuntary movements of cerebral palsy. Other abnormalities frequently found with them, such as paralysis, are not helped by the surgery.

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● RADIO

Saturday, August 10, 1957, 1:45-2:00 p.m., EDT.

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Dr. Robert H. Felix, director, National Institute of Mental Health, will discuss "Mental Health."

AGRICULTURE

Products from the Farm

A Presidential committee says the only practical solution to the problem of farm surpluses is to take the ordinary farm product and turn it into a product useful to industry.

➤ BEFORE WORLD WAR II Americans used 23 pounds of soap per person. Today they use eight pounds.

This does not mean Americans are dirtier now than they were 15 years ago. But it does mean the farmer has lost out along the line in his struggle for consumer acceptance of farm products. In 1956 we used soap made out of chemicals—15 pounds of detergents per person.

The replacement of the agricultural oils and fats used in soap-making by chemicals is only one of the more recent skirmishes between the farmer and what might be called scientific progress.

To mention just two others:

In 1950 we had to import leather hides because we could not meet the demands for them. Since 1955, however, cattle hides have become and are now surplus. Why? Today seven out of ten people walk on leather substitutes. That is one reason for the surplus leather.

Before the 1930's we used cloth woven from cotton, silk, flax, hemp and wool. Today, synthetics such as nylon, Dacron, Orlon and rayon cover our backs, our upholstered furniture, and our glass window panes.

These changes have cut 20% from the farmer's net income as a result of accumulated surpluses.

Paradoxically, industry loses too. Many of the imported crops used by industry—beans, oils, waxes—could be grown here. Or, research could be directed to finding domestic agricultural substitutes.

Less than a year ago, in August, 1956, President Eisenhower appointed a bipartisan committee with the title of Commission on Increased Industrial Use of Agricultural Products to investigate just what could be done about solving the problem of farm surplus.

The Nature of the Problem

The Commission, in its interim report recently published, finds there are really three problems facing the farmer:

There is the problem of surpluses—1,425 billion bushels of corn, and more than one billion bushels of wheat, for example.

There is the problem of creating a steady supply of agricultural products.

The problem of increasing the ability of the national economy to absorb the agricultural products on the market—at profitable prices.

Our growing population, which, it is estimated, will reach between 210,000,000 and 220,000,000 by the year 1975, will not be able to eat up the surpluses.

The answer to these three problems, which may be looked upon as one, is increased research for finding new ways to use the "old" farm products and to find uses for new crops.

The 16 task groups set up by the Commission to study possible solutions to the problems have come up with some exciting proposals for new uses and new crops.

New Uses for Old Products

Cashmere from corn is one. U. S. Department of Agriculture scientists have developed a process for making a cashmere-like textile fiber from corn protein. It is now being commercially produced.

Fiber from poultry feathers, 300,000,000 pounds of feathers are "surplus" each year and improved, flame- and wrinkle-resistant cotton and shrinkproof wool could answer the challenge of the synthetic chemical fibers.

Antibiotics are being made from cereal grains by a fermentation process. Wheat gluten could provide the necessary amino acids for concocting potent hormone-type weed killers. Recent research by the U. S. Department of Agriculture has demonstrated that combining amino acids with weed killing compounds increases their powers many times.

Even the detergent field has been invaded by the farmer: agricultural scientists have found a way to use agricultural oils and fats to make the chemicals that make the detergents!

Adhesives from lactose or milk sugar, hormones from wool grease, a hard carnauba-like wax from rice; the list is almost endless, bounded only by the skill, patience, and research of the scientist.

If the farmer does not feel like having his corn turned into cashmere, he can grow one of the promising new crops.

He can grow the Mexican yam. Dioscorea, its technical name, is a plant that can supply the hormone cortisone more economically and in larger quantities than the usual source, animal glands.

The farmer can raise jojoba or candelilla, both potentially useful for industrial waxes. It is estimated that industry can absorb 7,000,000 pounds of candelilla annually.

Guar, described as one of the oldest crops known to man, is another "new" crop with countless industrial applications.

A member of the legume family, the guar (pronounced gwar, like the second part of the name of the sports car, the Jaguar) plant has long flat pods which hold some six to nine "precious seeds." The

FABRIC FROM FEATHERS—The bowl on the right holds chicken feathers, destined to become fibers. R. A. O'Connell, of the U. S. Department of Agriculture, pours chemically treated poultry feathers, called "dope," into a pressure vessel. From the vessel the thick spinning dope will be forced through the tiny holes of a spinnerette and then given an acid-and-salt bath that sets the thin streams of dope into fibers.

seeds are "precious" because a unique gum, chemically a galacto-mannan, is derived from them.

Guar has been used as an ice cream stabilizer, as an appetite depressant — in colloid form it will swell in stomach juices—as a filter aid in mining uranium and potash, and as surface sizing for high quality paper.

Actually, guar, when it was introduced in Arizona in the early part of this century, was first planted because of its soil building properties. It thrives on sandy loams and light soils, apparently requiring little rainfall.

Pakistan and India now provide most of the guar used in the world today. The southwestern United States could greatly expand its production and the farmer would profit.

Research, finding new crops and new uses for the old ones, holds the key to an abundant and prosperous economy for the farmer, the consumer and industry.

Price for Research

How much will this research cost? The Commission on Increased Industrial Use of Agricultural Products recommends tripling the amount of money now appropriated by the Federal Government.

This would mean spending more than $48,000,000 a year.

Tripling any amount of Government spending in these days of Congressional economy drives would seem to be a doubtful procedure especially since appropriations administered by the Department of Agriculture last year totalled $5.3 billion.

However, less than one-fiftieth of this amount actually goes for research directed at the problem of eliminating agricultural surpluses. Most of the funds go for price support programs.

Each of the research programs proposed by the Commission's task groups can be achieved in the very near future. USDA scientists have accomplished near-miracles with projects in the past and the nation as a whole has benefited. They are responsible, for instance, for the large scale development of penicillin and frozen juice concentrates.

In contrast to the amount invested for agricultural research, American industries are currently investing at least $3 billion annually, and probably more, in research to create new consumer products, improve old ones, and improve raw material uses.

Secretary of Agriculture Ezra T. Benson reports that the nation's farmers have lost about one-fifth of their net income, or $2 billion a year, as a result of accumulated surpluses and excessive output.

Changing some of the farmer's surplus wheat into weed-killers, some of the milk into adhesives and improving such products as wool and cotton can turn this loss into profit.

An increased investment in agricultural research directed at finding new uses for "old" farm products—not only bigger and better yields of already surplus crops—can work magic with the farmers' products.

Science News Letter, August 3, 1957

BIOCHEMISTRY

Hormone from Whales

➤ WHALES MAY be the long-sought source of a growth hormone for the effective treatment of disease in man, Dr. C. H. Li, professor of biochemistry at the University of California, has reported.

Dr. Li spoke at the International Congress of Pure and Applied Chemistry meeting in Paris, France.

Growth hormone might be used in the treatment of cancer, dwarfism and other metabolic diseases.

The trouble is that no form of the hormone was found to be effective in man until last year. Then, Dr. Li and other scientists found that growth hormone taken from the pituitary glands of humans and monkeys is effective in man. But there is little likelihood that human and monkey hormones could be obtained in very large quantity.

In his experiments last year, when he isolated the human and monkey secretions, Dr. Li also noted a startling structural difference between the anthropoid and cattle hormone molecules. The cattle hormone, which is available in quantity, is effective in rats but not in man. Dr. Li suggested that this difference in structure might account for the difference in effectiveness in man.

The recent isolation of the whale growth hormone by Dr. Li and his colleague, Dr. Harold Papkoff, shows this secretion has a structure similar to that of the monkey and human hormones. Therefore, Dr. Li said, this structural kinship may mean that the whale hormone may be effective in man. Tests of this are now being made in the United States at the National Cancer Institute, Bethesda, Md.

If whales produce a hormone effective in man, they would provide a quantity source. Each humpback whale—the species from which Dr. Li's preparation comes—yields ten times as much hormone as a human pituitary. And the blue whale would yield glands weighing 50 times as much as the humpback.

Dr. Li also reported success in chemically removing large chunks of various growth hormone preparations without reducing their potency. This was done for cattle, sheep, whale, monkey and human growth hormone.

He said that, although there are differences in size and structure of the various hormones, this work supports a theory that all of the hormone molecules may have a common structural core that is responsible for the growth properties.

Science News Letter, August 3, 1957

PSYCHOLOGY

Experience Affects Vision

➤ A ZULU lives in a round world. If he does not leave his reserve, he can live his whole life through and never see a straight line or a square corner. For this reason Zulu herd boys have been useful to American scientists in studies of the effect of experience on our ways of seeing things.

Drs. Gordon W. Allport and Thomas F. Pettigrew of Harvard University decided to find out how a certain striking optical illusion would look to a Zulu boy who had never seen a rectangle.

To present this illusion, a frame that looks like a window divided into six "panes" is rotated at a short distance from the observer. It looks like a window, that is, to anyone familiar with windows. It is really a trapezoid with only two sides parallel.

As it rotates, American eyes tend to see it as swinging back and forth instead of going round and round.

The Harvard scientists wondered how it would look to Zulu herd boys who had never seen a window. Would they be fooled about its motion?

They showed the rotating "window" to a group of herd boys who had never been off the reserves or gone to school and also to boys of the same age in the city who had seen some buildings of European type architecture. A comparison group of European boys in the city were also tested.

A very significant tendency was found for the city boys, whether European or African, to see the illusion more often than the herd boys, especially when the window was viewed with both eyes and at a ten-foot distance. These are the conditions when binocular cues to true rotation are most plentiful. It is under these conditions that previous experience with rectangular windows seems to make more of the city boys mis-perceive the "window" as swinging back and forth.

The word "zulu" means heavens or firmament and the aesthetic ideal of round rather than angular styles affects native art, architecture and even speech. It is possible to say "round" in Zulu, but there is no word for "square." There is a word for "circle" but not for "rectangle."

Huts in Zululand are invariably round. They have no windows and doors are merely round entrance holes. They are arranged in circles with round stockades to fence in animals. Fields follow the irregular contours of the rolling land; there are no rectangular plots.

It is commonly said in Natal that Zulus fresh from reserves cannot plow a straight furrow and are unable to lay out a rectangular flower bed.

Science News Letter, August 3, 1957

Exercise builds additional paths of *blood* circulation to the heart which could offset the effects of narrowed arteries.

BIOLOGY

New Hemoglobin Discovered in Hindu

➤ A NEW TYPE of hemoglobin has been found in the blood of a human being.

The discovery was made when the blood of a Punjabi Hindu was examined in a London hospital and was reported by Dr. J. A. M. Ager of St. Thomas' Hospital and Dr. H. Lehmann of St. Bartholomew's Hospital, London, England.

Hemoglobin is the substance that makes blood red and gives it the necessary ability to carry oxygen from the lungs to the rest of the body. It is a complex protein that attracts oxygen molecules and holds them in a loose bond until they are carried to the tissues.

Without it human life could not go on, and when the amount of hemoglobin is low, or when there are too few red blood cells containing it, anemia develops.

Eleven types of hemoglobin are recognized now and these are distinguished by a test which measures their movements in an electric field. When the test was run on the Hindu, his blood was found to contain two types, one was hemoglobin A, a type already known, and the other was an unknown which will probably be named hemoglobin L.

The Hindu was born of the Khashtri caste in Pakistan and had a normal blood picture except for the new hemoglobin.

Types of hemoglobin now existing are A, C, D, E, F, G, H, I, J, K, and S.

Science News Letter, August 3, 1957

SOIL SCIENCE

Soil Phosphorus Measures Organic Waste

➤ THE VANISHED houses of prehistoric people have left traces in the soil on which they were built, Dr. Eugene F. Dietz of Madison, Wis., reports in *American Antiquity* (April).

Even when no visible evidence of the ancient habitation remains, Dr. Dietz reports, soil analysis can show that men once lived there. The reason lies in man's ancient habit of discarding the waste from the dinner table close to his tent or house.

This waste was composed largely of animal and bird bones, fish remains and other such organic material rich in phosphorus.

Modern soil science has shown repeatedly, Dr. Dietz notes, that where soluble phosphate is applied to the soils within the humid regions and where the soil is on the acid side, such soluble phosphate is quickly fixed by aluminum, iron and calcium ions. With time, the phosphorus is slowly leached into the subsoil. The indications are, however, that there is relatively little lateral movement of the phosphorus.

But, once the dissolved phosphates have become fixed in the soil, further dissolving by rain water is a very slow process. It would probably take thousands of years to dissipate the phosphorus.

Dr. Dietz, with the help of a nephew who is studying soil science at the University of Wisconsin, made a careful soil analysis of a site where arrowheads and scattered chips of chert indicated that prehistoric Indians may have lived.

The tract was marked off in five-foot squares and a soil sample was taken from the center of each square. It was discovered that some of the very low values for phosphorus were found next to squares with high values.

It is possible that the low values show where the ancient dwelling was located and the high values where the refuse was heaped.

Another possible use for the soil sampling method is suggested by Dr. Dietz. High phosphorus values could indicate where to dig in mounds so that burials could be located without tearing up the whole mound.

Soil phosphorus could also pin-point where a large animal such as a mammoth or mastodon had died.

Science News Letter, August 3, 1957

ENTOMOLOGY

Aphid From Europe Has Foresters Worried

➤ CHERMES, AN UNWELCOME aphid from Europe, is on the loose in Washington's Gifford Pinchot National Forest. What to do about it is a multi-million dollar problem for which there is as yet no answer, Homer Hixon, forest supervisor at Vancouver, Wash., has reported.

Chermes landed—no one knows how—in the rich green carpet at the base of Mt. St. Helens about 1953 and it has been acting the part of the proverbial "bug in the rug" ever since.

The aphid has fanned out in a broad arc around the southern and western base of the mountain, destroying as it goes. Some 47,000 acres of prime forest containing many million board feet of timber are infested. And the foresters do not know how to keep it from going as far as it pleases. Chermes has no natural enemy in this country.

The only bright spot is that the insect so far has left Douglas fir trees pretty much alone, concentrating on white and silver fir. This infestation has reached epidemic proportions, Mr. Hixon said, and has extended to state and private lands as well as national forest domain.

Chermes at work looks like a scale—a type of pest familiar to many orchardists. It attacks the cambium layer of needles and smaller limbs, and within two or three years the tree is dead.

Action against it is proceeding on two fronts. A sub-group under the Pacific Northwest forest pest action committee has been set up to study ways of combatting the pest, including the possibility of finding and importing a natural enemy from Europe. Private, state and national foresters are represented on the committee.

Meanwhile the Gifford Pinchot foresters are salvaging as much as possible. Harvesting dead trees began in 1956 as some infected areas were opened to loggers.

Science News Letter, August 3, 1957

IN SCIEN

ANIMAL PSYCHOLOGY

Grasshopper Hears Higher Frequencies Best

➤ A GRASSHOPPER is much less sensitive than you are to the low sound frequencies where the human voice is pitched, but when it comes to hearing the sound made by another grasshopper, the grasshopper's hearing becomes more sensitive while man's drops off.

This was revealed when Dr. Ernest Glen Wever and Jack A. Vernon, psychologists of Princeton University, amplified the nerve currents from an Atlantic grasshopper's hearing nerve and listened to them in a telephone receiver.

A grasshopper has no ear with which to hear. The purpose of an eardrum is served by a tympanic membrane, visible through an opening in the chest of the insect. It was from the tympanal nerve, serving this membrane, that the scientists listened in on the grasshopper's hearing.

The grasshopper is relatively insensitive at the low frequencies, 100 cycles per second or the deepest notes of a bass voice. But its sensitivity improves at a fairly regular rate of six to seven decibels per octave. At 15,000 cycles, which is the pitch of some kinds of grasshopper's chirp and close to the limit of human hearing, the grasshoppers tested still had less acute hearing than man, but the rate of improvement was such that it seems likely that at still higher frequencies the insect's hearing would surpass human ears.

The "voice" of a grasshopper does not come from a throat. Instead, the insect uses one hind leg as a kind of violin bow to produce the chirp by rubbing it against the other leg or against the wing case.

This "song" can apparently be heard better by another grasshopper than by man.

Science News Letter, August 3, 1957

AGRICULTURE

Chemicals Promote Lettuce Seed Sprouting

➤ A GROUP of chemicals that stimulate the germination of lettuce seeds has been reported by scientists at the University of Texas, Austin. Further tests are being made to determine if the chemicals have other plant growth promoting value.

Solutions of the new compounds in water caused 30% to 75% of the lettuce seeds tested to germinate in 48 hours. Only about seven percent of the seeds exposed to water alone germinated in the same time.

The growth promoting chemicals, 6-(substituted)-aminopurines, were prepared by Drs. Charles G. Skinner, Pete D. Gardner and William Shive, who report their findings to the *Journal of the American Chemical Society* (June 5).

Science News Letter, August 3, 1957

CE FIELDS

CHEMISTRY

Cobalt 60 Radiation Aids Chemical Reaction

➤ THE RADIATION from cobalt 60 can speed up the chemical combination of hydrogen and carbon monoxide into hydrocarbons by as much as 60%, two scientists have found.

The 60% increased yield continues for as long as 180 operating hours, R. W. Clarke and E. J. Gibson of the Fuel Research Station, London, England, report. It was discovered in studies aimed at finding a radiation effect that would work "for reactions of practical interest," they state in *Nature* (July 20).

Most radiation effects in solids disappear during quite short periods at room temperatures or higher, but the one they found lasts for a maximum of 300 hours at temperatures of more than 500 degrees Fahrenheit.

The synthesis of hydrocarbons from hydrogen and carbon monoxide, known as the Fischer-Tropsch process, takes place at high temperatures in the presence of cobalt or iron catalysts, which are materials that make chemical reactions "go" without being affected themselves. No radiation effects were found with the cobalt catalysts but unreduced iron ones increased yields from 10% to 60% for periods as long as 300 hours.

Besides this long lasting effect, the size of the particles irradiated by the gamma rays from cobalt 60 was found to be critical. Only those smaller than two millimeters, or about eight-hundredths of an inch, gave the increased yield.

Science News Letter, August 3, 1957

ACOUSTICS

Future Hearing Aid Will Stretch Words Apart

➤ A REVOLUTIONARY TYPE of hearing aid that not only amplifies speech sounds but also slows down their speed has been perfected in the laboratory but still must be made small enough for a person to wear.

This was reported by Dr. William G. Hardy, director of the Johns Hopkins Hearing and Speech Center, Baltimore, Md., to sales representatives of Zenith Radio Corporation meeting in Chicago.

One of the problems of present-day hearing aids is that they do not completely help people who have nerve losses. In rapid conversation these people miss many words because their hearing mechanism cannot respond as quickly as it does in normal people, Dr. Hardy told SCIENCE SERVICE.

A "sound-spacer" to solve the problem would be able to record the conversation and then play it back in such a way as to stretch the words apart.

There are approximately 4,500,000 hearing aid users in the country and probably a third of them have the kind of neural loss that could be helped by a sound spacer.

The difficulty of words running together becomes more common with advancing age, especially in regard to women's voices.

Laboratory devices to accomplish speech stretching have used tape machines for recording and playback. This is so far the easiest way to do the spacing, Dr. Hardy said, but it is completely impractical for the average person.

It would require "a knapsack" of equipment to be carried around by the hard-of-hearing person. The main problem now is to develop a tiny electronic device to do the same job.

Other future improvements in hearing aids are expected to include binaural hearing devices that give an increased sense of the direction from which sound comes, and new hearing aids that can completely fit inside the ear.

Science News Letter, August 3, 1957

CHEMISTRY

Study of Simple Flames Can Improve Jet Engines

➤ CHEMISTS can create superior fuels and engineers can develop better jet engines by studying simple flames such as that of a kitchen gas range or an ordinary laboratory Bunsen burner.

That is the conclusion of three American chemists who presented preliminary results of research on the mechanisms of gas flames to the 16th International Congress of Pure and Applied Chemistry, meeting in Paris, France.

Drs. William H. Avery, group supervisor, A. A. Westenberg, project supervisor, combustion research section, and Robert M. Fristrom, Johns Hopkins University Applied Physics Laboratory, Silver Spring, Md., reported that data from studies of simple flames can be used in predicting the behavior of complex flames and reactions such as are produced in jet engines. Dr. Fristrom presented the paper.

Dr. Westenberg told SCIENCE SERVICE that nearly all chemical reactions, especially those involving high speed changes such as in flames, but also even some non-flame reactions, involve the same principles and mechanisms in getting from the starting materials to the final product.

"This means," Dr. Westenberg said, "that if we can learn exactly how a simple flame operates we could apply that knowledge to fuels and engines and even extend it to other chemical reactions that do not necessarily involve flames.

"Essentially, we are able to study a jet engine reaction without being confused by the many side reactions and combustion products of complex jet fuels," Dr. Westenberg explained.

He said the Johns Hopkins group, working under a Navy contract, chose propane, often used as a bottled cooking gas, for the initial study because of its simplicity.

Science News Letter, August 3, 1957

RADIO

Around-the-World Radio Reception Reported

➤ AN UNUSUAL record of around-the-world radio reception at very high frequencies is reported by G. W. Luscombe of the Radio Research Station, Ditton Park, Slough, Bucks, England.

Further studies of the mysterious method by which the signals are propagated are underway, since there is at present no satisfactory explanation for why the ionosphere would reflect radio waves of 37 megacycles by this roundabout path.

The reception in Great Britain of the delayed signals from Gibraltar was strongest between 9:00 a.m. and 10:30 a.m., Universal Time, Mr. Luscombe reports in *Nature* (June 20).

He believes the reason for this is that the great circle path on which the radio waves would have traveled is close to the twilight zone during these hours. The great circle path is longer than the direct one, accounting for the delay.

The delayed signals are heard about 140-thousandths of a second after the direct transmission. They were discovered in studies of very high frequency forward scatter propagation, which is a recently developed method of long-distance communications.

Science News Letter, August 3, 1957

PHYSIOLOGY

Acid-Balance Mechanism Of Stomach Discovered

➤ A DELICATELY balanced mechanism which helps maintain proper acid levels in the stomach has been discovered by a doctor at the University of California at Los Angeles Medical School.

Dr. Edward R. Woodward has found that the flow of hormones which stimulate acid secretion in the stomach is immediately "shut off" when the acid-alkaline balance of the stomach reaches a certain point.

These hormones are secreted by an area adjacent to the stomach's exit, known as the antrum. (This mechanism of acid control is in addition to that of the vagus nerves.)

A 10-year study by Dr. Woodward has helped detail the role of the antrum, which comprises about 20% of the stomach. The function of this non-acid-producing stomach area had long been a puzzle to medical science.

The presence of food in the stomach, and its resultant expansion, stimulates antrum hormone production, which in turn results in acid secretion. An upset in the hormonal mechanism may be one cause for the formation of gastric ulcers, Dr. Woodward says.

Surgical procedures for correction of duodenal ulcers have changed radically in recent years as a result of a better understanding of the antrum's function, Dr. Woodward points out.

A report of Dr. Woodward's findings appears in a recent issue of *Gastroenterology*.

Science News Letter, August 3, 1957

MEDICINE

Human Bones Replaced

Scientists have found a way to treat animal bones so they can be used to rebuild the human body. This would be priceless if anything were to happen to our bone supply.

By JOHN W. ROBINSON

➤ DAY AFTER DAY, small quantities of a glistening white substance that promises to prevent the disfigurement of thousands of victims of an atomic attack are being prepared in a small laboratory at the Naval Medical Research Institute, Bethesda, Md.

The samples have been sent to all parts of this country and many foreign ones as well, where both surgeons and dentists are giving them exhaustive tests in the human body.

The white material is a new kind of bone, known as anorganic bone. Most of it originally came from cows, but it could just as well have come from pigs, sheep, or almost any other kind of animal. The important thing about it is that special treatment has changed it into a bone that will "take" in the human body the same way that human bone grafts take and become a solid part of their new host.

The great advantage of the new graft material is that it can be had in almost limitless supply. Every stockyard in the U. S. is a potential warehouse for it, and, once prepared, it requires no refrigeration, no sterile handling or any of the other precautions that make human bone grafts so difficult to keep on hand.

The demand for bone grafts will be second only to that of blood if we are ever faced with mass casualties. Then, the supplies of human bone now ready in bone banks would be woefully inadequate. Even if transportation were available, the present stockpile would be wiped out overnight.

In this kind of an emergency the new bone would be lifesaving, says Capt. Fred L. Losee, USN, of the Institute, the man who has been primarily responsible for its development.

The bone is made from animal bones which have been treated with ethylenediamine, an organic solvent that dissolves away all the inside material subject to decay. These organic substances are believed to be the main cause of the reaction that keeps bone grafts from taking when transplanted from one type of animal to another, or from animals to man.

Advantages of the New Bone

The treated bone is very white, easily shaped and extremely porous. Its advantages over natural bone are its freedom from decay and the ease with which it can be sterilized by either boiling or autoclaving.

For human grafting, the anorganic bone is much easier to handle than freeze-dried human bone obtained from a bone bank. This latter type has to be taken from the donor under sterile conditions and kept that way until used. Anorganic bone, on the other hand, can be kept indefinitely in any closed container and then autoclaved immediately before transplanting.

For use, the bone is usually ground up into particles of varying sizes, depending upon the size of the graft area. The particles are packed into the defect and remain there while natural rebuilding begins.

The rebuilding is possible because the treated bone contains thouands of cavities and inter-connecting passageways through its lattice-like structure. Into these are sent tiny new blood vessels that flood the area with a rich supply of blood, a process known as revascularization.

Then, after a good network of blood vessels has been established through and around the chips, new bone cells made by the host's body circulate in the network and attach themselves along the sides of the little canals.

As time goes on, the artificial bone is slowly supplanted by this new bone growth and eventually the grafted material is completely replaced and absorbed by the body. This final stage of repair is known as remodeling.

Dental Applications

Capt. Losee, himself a dental researcher, foresees tremendous possibilities for anorganic bone in the fields of dentistry and oral surgery.

For oral surgery the bone chips can be used to pack holes in the jaw bone left after tooth extractions. The edges of these holes tend to round off slowly with time, a process that can be eliminated by rebuilding the area with the chips and thereby saving the denture wearer a sizable amount of his own bone.

Another use may be in rebuilding tooth dentin. When deep cavities are prepared for fillings, sometimes the drilling must cut away so much of the dentin that the underlying pulp of the tooth is exposed. It may be possible to sprinkle anorganic dentin "dust" over the area and have it create a solid new dentin coating for the tooth.

TEETH FROM COW BONE—A lucky monkey at the Naval Medical Research Institute, Bethesda, Md., gets a new front tooth. It will be fused in place with chips from the piece of chalk-like anorganic bone that Cdr. Harvey Lyons of the Institute holds in his left hand. The new type bone has now proved to be successful in rebuilding human bone.

Dental uses for the anorganic bone chips have already been extensively tested in monkeys by Lt. Cdr. Philip J. Boyne and Cdr. Harvey Lyons at the Institute. This has led naturally to human trials, and successful use of the bone in humans has been reported by Drs. Boyne and Losee.

Capt. Donald Cooksey, an oral surgeon at the Naval Dental School, Bethesda, Md., is also using it in selected human cases.

For orthopedic bone surgery the first use of the bone in humans probably took place in September, 1956, when it was used to repair a crushed heel bone.

But the new bone is not a direct replacement for banked human bone grafts, Capt. Losee emphasizes. It should be considered only as a supplement to the human bone that is available, he believes.

One reason for this is that anorganic bone loses some of its tensile strength in the treatment process. The chemical solvent removes the collagen fibers of the bone, necessary to give it strength. In applications where a large area of strong bone is needed, anorganic bone would not work as well as a human graft.

One way to improve the strength of the bone may be to treat it incompletely with the solvent, Dr. Boyne explained. In this way, the exposed surfaces become anorganic but the core does not, and the entire graft remains much stronger. This possibility is now being tested.

Grafts Take Faster

An important advantage of anorganic bone is that it can be revascularized faster than freeze-dried human bone. Since all the organic debris has been removed from the bone's lattice-work, blood vessel growth can begin immediately. With human graft material, however, the body must clear out the organic material before the new blood supply can be established. Thus the synthetic bone actually saves the body time in accomplishing the same result.

Also, with freeze-dried bone, there is always the possibility that the graft may contain a virus, such as hepatitis virus. This might become reactivated in the new host, Capt. Losee believes.

The development of the bone was an unexpected offshoot of basic research done on the cause of tooth decay. Capt. Losee has been studying the differences between healthy teeth and decaying ones for more than 20 years and developed the bone to see what composes both the organic and inorganic parts of bone.

He devised the ethylenediamine process to obtain samples of a non-organic type of bone which he decided to call anorganic. Shortly afterwards, a reserve medical officer at the Institute, Dr. Lloyd Hurley, now at Presbyterian Hospital, New York, mentioned the difficulties in having bone grafts from one species of animal to take in a different species. Capt. Losee casually mentioned his treated bone and the work began.

The first bits of anorganic bone were transplanted in animals in the spring of 1955 at the Institute by Dr. Hurley with excellent results. The grafts took and prospered, with no sign of any foreign body reaction.

Then its use was picked up by another reserve medical officer, Dr. Hugh Rosomoff, a neurosurgeon now at Presbyterian Hospital, New York, who experimented with putting anorganic bone plugs in dogs' skulls.

Since then extensive animal trials and now human tests have proved the value of the new material.

At present Capt. Losee's lab is the country's only supplier of the bone and he has sent nearly 75 samples of it to researchers throughout the world. A large meat packing company has also become interested in the process and plans to make available bone from various types of animals.

Nature's Anorganic Bone

The age of the original bone is no barrier to its use for grafting, Capt. Losee has discovered. Dramatic proof of this came from experiments with bone brought back to him by Capt. Merrill Wheatcroft of the Naval Dental School from an Egyptian burial ground dating back between the 4th and 5th Dynasties.

"Nature had already removed all the organic material from the bone and we grafted it into the hind leg of a dog," Capt. Losee recalls.

The graft took as well as ethylenediamine treated bone and the dog became the first one in history to have leg bone nearly 7,000 years old.

Science News Letter, August 3, 1957

TECHNOLOGY

Blasting Noise Tests Jet, Missile Components

➤ ELECTRONIC components for jets and guided missiles are being tested by exposing them to high-intensity sound, A. R. Hopkins, a Radio Corporation of America executive, has revealed.

To give engineers ideas on how to design better components that will withstand the terrific sound vibration in jets and missiles, "white sound," or pure sound of wide frequency range, with intensities up to 145 decibels, is beamed on components placed in a sound chamber.

A decibel, db, is a measure of sound power. When you whisper, your voice has an intensity of about 20 db. When you shout, you are generating sounds between 50 and 60 db. Human beings can tolerate only about 140 db.

Two models of the noise-machine, 36 by 18 by 72 inches, and 9 by 9 by 24 inches, generating sound with a range of 20 to 10,000 cycles per second, have been developed by acoustics engineers of RCA's theater and industrial products department.

Science News Letter, August 3, 1957

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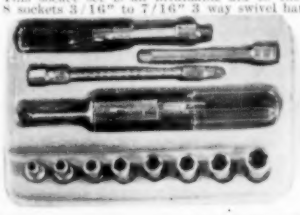

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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N. W., Washington 6, D. C. Rec t free publications direct from publisher, not from Science Service.

THE ADVANCEMENT OF SCIENCE: Vol. XIII, No. 53, June 1957—H. Hamshaw Thomas and others, Eds.—*British Association for the Advancement of Science*, 144 p., illus., paper, 7 s. 6 d. Recent scientific reports on topics of timely interest.

BIBLIOGRAPHY ON SOUTHWESTERN ASIA: IV, A Fourth Compilation—Henry Field—*University of Miami Press*, 464 p., paper, $12.00. A listing of selected titles, especially those published in 1956, for the specialist and student of this area which includes Turkey, Syria, Lebanon, Israel, Egypt, Jordan, Saudi Arabia, Yemen and other potential trouble spots.

BIOCHEMICAL DISORDERS IN HUMAN DISEASE—R. H. S. Thompson and E. J. King, Eds.—*Academic*, 843 p., illus., $12.60. For many diseases, pathology is now passing from the stage of morbid histology to that of morbid biochemistry.

CHEMISTRY—Michell J. Sienko and Robert A. Plane—*McGraw-Hill*, 621 p., illus., $6.75. Based on the lectures given in the introductory chemistry course at Cornell University. Great emphasis is placed on the principles sometimes at the expense of descriptive details.

ECONOMIC DEVELOPMENT: Theory, History, Policy—Gerald M. Meier and Robert E. Baldwin—*Wiley*, 588 p., diagrams, $8.50. Discussing the problems of accelerating development in poor countries and maintaining development in rich countries. Intended especially for college students majoring in economics.

FOOD FACTS TALK BACK: Food Information, Fallacies and Facts—*American Dietetic Association*, 32 p., illus., paper, 50 cents. Do you believe that eating raw potatoes will cause worms or that white eggs are more nutritious than brown? This little book tells the facts about these and many other common food beliefs.

FOOT TROUBLES—T. T. Stamm—*Philosophical Library*, 122 p., illus., $4.75. You should get about 250,000 miles out of your feet during a lifetime. This little book tells how to avoid many foot discomforts and how others can be cured.

FRONTIERS OF ASTRONOMY—Fred Hoyle—*New American Library*, 317 p., illus., paper, 50 cents. Inexpensive paper edition of a book originally published by Harper in 1955. Includes the "steady-state" theory, supported by the author and Drs. H. Bondi and T. Gold.

THE INTERRELATIONSHIPS OF THE NEW AND OLD WORLD HYSTRICOMORPH RODENTS—Stuart O. Landry, Jr.—*University of California Press*, Univ. of C. Publications in Zoology, Volume 56, No. 1, 117 p., illus., $2.50. Discussing the evolution that moved the biting power of the jaw forward to the front of the jaw with its chisellike, ever-growing incisors, and the distribution of the Hystricomorpha in South America, Europe, Asia and Africa.

MICROWAVE MEASUREMENTS—Edward L. Ginzton—*McGraw-Hill*, 515 p., illus., $12.00. A basic text for graduate students and a reference work for those working in the field.

PHYSICS FOR SCIENCE AND ENGINEERING—Robert L. Weber, Marsh W. White and Kenneth V. Manning—*McGraw-Hill*, 618 p., illus., $8.00. Introducing basic concepts and principles of general physics at the university level and designed especially for students of science and engineering.

RESEARCH ON FIRE: A Description of the Facilities, Personnel and Management of Agencies Engaged in Research on Fire—Horatio Bond, Ed.—*National Fire Protection Association*, 184 p., illus., $5.00. Two of the founders of the Massachusetts Institute of Technology were pioneers in the study of fire protection, and the study of fire was one of the original purposes of MIT.

STATE CONTROL AND ADMINISTRATION OF ATOMIC RADIATION—William C. Ellet—*Institute of Public Affairs, State University of Iowa*, 48 p., paper, $1.00. Private ownership of atomic materials and production facilities makes the hazards of radiation a concern of state governments as protectors of public health and safety.

SYMPOSIUM ON NUTRITION AND BEHAVIOR—Josef Brozek, Guest Ed.—*National Vitamin Foundation*, 124 p., illus., paper, $2.50. Proceedings of a symposium devoted to a topic of interest to many professions.

TIDAL MARSHES OF THE GULF AND ATLANTIC COASTS OF NORTHERN FLORIDA AND CHARLESTON, SOUTH CAROLINA—Herman Kurz and Kenneth Wagner—*Florida State University*, 168 p., illus., paper, $1.00. Report of an investigation made of the principal factors in the dynamics of the encroaching sea made before the activities of man should have complicated the problem.

THE WORLD OF THE DINOSAURS—David H. Dunkle—*Smithsonian*, 22 p., illus., paper, 50 cents. Dinosaurs first appeared on earth about 200,000,000 years ago and persisted for some 130,000,000 years. This booklet shows the conception of scientists of how they looked and acted.

Science News Letter, August 3, 1957

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PUBLIC HEALTH

Stigma of Leprosy Kept Alive by Writers

➤ CURRENT STORIES, articles and novels are keeping alive the stigma of Hansen's disease, or leprosy, even though patients can now be treated successfully and returned to their homes. An appeal to writers to eliminate such cliches as "He treated me as if I had leprosy," "The man is a moral leper—stay away from him," and the like, has been made by Dr. Ira D. Hirschy of the Department of Health, Honolulu, Hawaii.

These phrases are written without any intent to harm, but they strike a disastrous blow to the morale of former patients who have had the disease, been treated, and then returned home as noninfectious.

Hansen's disease can now be successfully treated with sulfone drugs if it is diagnosed and treated promptly. But all too often former patients meet such ostracism they cannot get a job or be accepted by the community. This happens both to patients discharged from Kalaupapa in Hawaii and from Carville, La.

One type of Hansen's disease is not even infectious, but the patient is shunned as if he were a source of contagion.

The stigma attached to the disease has existed for centuries and is kept alive, in part, by the publication of phrases which link the disease to horror, fear and ostracism.

"Authors have a real opportunity to help simply by avoiding destructive comparisons and by writing of Hansen's disease as it now is, an illness which can be treated," Dr. Hirschy reported.

Science News Letter, August 3, 1957

GENERAL SCIENCE

What Makes a Scientist?

A study of the factors that influence and motivate young students toward careers in science is being conducted by Science Service's Science Youth Division.

➤ WHAT MAKES a scientist? A research study is underway in Washington to uncover the factors that lead young people to decide on a career in science.

Under the direction of Dr. Harold A. Edgerton, chief of SCIENCE SERVICE'S Science Youth Division, the study aims at recreating the ingredients that make up a young student's mind on becoming a scientist.

Information for the study will come from men and women who at one time were eager science-minded youngsters themselves. They are the early winners of the Science Talent Search for the Westinghouse Science Scholarships.

At least 150 former Search winners for the years 1942 and 1943 will be interviewed to try to unravel those factors which contributed to the encouragement and development of these persons towards promising careers as creative scientists.

By collecting data on the why and how of the former winners, it is expected valuable information will be gained that will help in selecting, encouraging and training science personnel. One of the chief aims of the study is to learn at what age youngsters are motivated toward a science career and how.

The study is being supported in its first year by an $18,500 grant from the National Science Foundation.

The annual Science Talent Search was started in 1942 with the cooperation and financial assistance of the Westinghouse Educational Foundation of the Westinghouse Electric Corporation. Each year, 40 top winners and 260 honorable mentions are chosen from competing high school seniors from throughout the United States. The top 40 are awarded trips to the Science Talent Institute, conducted by Science Clubs of America in Washington, D. C.

Since 1942, 640 winners and 4,160 honorable mentions have been selected.

Results of the study, Watson Davis, director of SCIENCE SERVICE, explained, will be made available to those organizations and persons interested in utilizing the results to improve their science personnel program.

White Collar Jobs

➤ WHITE COLLAR jobs exert a strong pull for American youth, according to Dr. Ralph H. Turner, associate professor of sociology at the University of California at Los Angeles, who is making a study of the social and economic aspirations of high school seniors.

He reported that of a group of 1,262 Los Angeles area high school males who filled out his questionnaires, only 25% of them indicated an intention of going into occupations involving manual labor. Yet 48% of this group comes from families where the breadwinner does some sort of manual labor.

Though only 12% of the group's families are from professional and semi-professional backgrounds, 53% of the sons aspire to these occupations.

The three-year research project involves a study of approximately 2,900 high school and 1,300 college students of both sexes. Dr. Turner will attempt to identify the values and attitudes of people who are striving for a higher social and economic level than that of their parents. Education is generally the vehicle used by the young people in this "upward mobility" process.

Dr. Turner is presently making a parallel study in England, the results of which will be compared with the American study.

Educators may be particularly interested in the project because it will indicate the problems of changing values and "complications in interpersonal relations" which are likely to develop during the climb up the social and economic ladder.

It will also help educators by identifying the kinds of students who are most likely to strive for a higher level, providing information on the students' relations with peer groups, and shedding light on the values of students from different class backgrounds.

Science News Letter, August 3, 1957

PHARMACOLOGY

Non-Laxative Drug for Chronic Constipation

➤ A NEW non-laxative drug that can end chronic constipation in many cases is reported by Drs. Manuel Correia-Branco, Manuel Kaufman, Raymond F. McAteer, Leonard P. Landry and Howard E. Lind of the Brooks Hospital, Brookline, Mass.

The drug, now being sold without a prescription under the trade name of Regutol, is technically not a laxative since it does not increase intestinal motor activity, the scientists say.

It acts by purely physical means and is actually a softener of intestinal obstructions. The drug is nontoxic even when used over long periods of time and creates no adverse side effects.

Tested in 183 cases of chronic constipation, the non-laxative was fully effective in 86% of the patients after the 12th day of treatment.

The drug is chemically known as dioctyl sodium sulfosuccinate and releases most patients from continued use of conventional laxatives.

In severe cases it is combined with a laxative at first, and then when normal intestinal movement has been restored, the laxative is eliminated.

The drug can be taken regularly for an indefinite period of time, the doctors report.

It is particularly valuable in such conditions as abdominal surgery, cardiovascular disease and pregnancy.

The researchers made their report in *American Practitioner and Digest of Treatment* (July).

Science News Letter, August 3, 1957

In *sunstroke*, body temperature rises, skin grows hot and dry, face reddens and a shooting headache develops, while heat exhaustion's symptoms are low body temperature, cold, clammy skin, pallor, dizziness and a dull headache.

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PSYCHOLOGY

Test Culture Differences

➤ WHAT IS a mouth for?

Your answer to questions like this is useful, a psychologist has found, in showing the values of the culture in which you live.

The psychologist made a study of the answers of children of three different cultures in Beirut, Lebanon, and in Omdurman, capital of Sudan. American children going to the American Community School in Beirut, and Lebanese and Sudanese children were questioned.

The greatest proportion of the children of all three groups said that the mouth is for eating, but they differed materially on other uses for the mouth.

A larger percentage of the Americans than of the other two groups said that the mouth is for talking. The Sudanese children were the only ones to say that the mouth is for drinking. Sudan is very hot and the people there consume a lot of water.

These cultural differences are reported by Dr. Wayne Dennis of Brooklyn College, Brooklyn, N. Y., to the *Journal of Abnormal and Social Psychology* (July), based on a study he made while visiting professor at the American University of Beirut.

The common picture of the American father is shared by the Lebanese, Dr. Dennis finds.

To both American children and Lebanese, a father is for working and earning money for the family. To the Sudanese child, father is not just the person who brings home the money. He is also someone who cares for him and helps him.

Dogs and cats may be pets to be fondled or played with by the American child. But to both Lebanese and Sudanese they serve a useful purpose in guarding the house or catching mice.

Sand is to be played in to the American child; it is a building material to the Lebanese and Sudanese.

Wood is for building houses to the American child but not the child in Lebanon or Sudan where houses are always made of stone. To the Lebanese and Sudanese, wood is for making furniture.

Gold is for decoration to both Lebanese and Sudanese; it has economic value only to the American child. But in Lebanon, chocolate candies are commonly wrapped in gold foil. Many of the younger children said that gold is "to wrap candy in."

Science News Letter, August 3, 1957

TECHNOLOGY

Plant Powered by Its Own By-Product

➤ A MODERN CHEMICAL plant to be built for Atlas Powder Company will need no outside source of fuel once operations have started.

After production begins in the new nitric acid and ammonium nitrate plant, the heat energy produced by burning ammonia as part of the production process will be channeled back into the operation to provide energy needed for reactions elsewhere in the plant, D. J. Carroll Copps, senior vice president in charge of the company's explosives division, explained.

Mr. Copps said the plant will be the first "self-sustaining" plant of its type to be built in the United States.

The $4,000,000 facilities are being constructed in Missouri by The Chemical and Industrial Corporation, Cincinnati, Ohio.

Science News Letter, August 3, 1957

Questions

AGRICULTURE—What are some of the industrial uses for guar? see p. 70.

□ □ □

CHEMISTRY—How high a temperature has been produced by cyanogen-oxygen flames? see p. 67.

□ □ □

MEDICINE—What is the cause of the disease mucormycosis? see p. 68.

□ □ □

How is animal bone treated to transform it into anorganic bone? see p. 74.

□ □ □

PUBLIC HEALTH—What compound is being used to dissolve and extract the tars in cigarette smoke? see p. 69.

□ □ □

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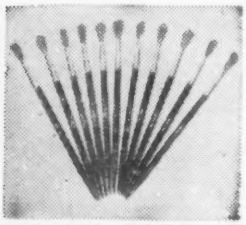

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PSYCHIATRY

Segregation Causes Negro Mental Illness

➤ SEGREGATION and the uncertainty accompanying cultural change are blamed for a greatly increased rate of mental illness among the Negroes of Virginia.

The charge that segregation is driving the Negro mentally ill is made by Dr. David C. Wilson, psychiatrist of the University of Virginia Hospital in Charlottesville, and Miss Edna M. Lantz, statistician for the Virginia State Department of Mental Hygiene and Hospitals, in a report to the *American Journal of Psychiatry* (July).

The Negro rate of first admissions to the state hospitals in proportion to Negro population is increasing and is now more than double the rate for whites and greatly increased over what it was in 1918-1925.

It has been said, the authors explain, that mental illness among the Negroes is due in the main to feeblemindedness, alcoholism and epilepsy. But, they found, when admissions for these causes are not counted for either whites or Negroes, the picture of excessive mental illness among the Negroes and its increase in recent years remains the same. Actually, Negroes have a rate of admission because of alcoholism less than half that for whites.

The Negro in Virginia, state the authors, is far better off economically and legally than ever before, but he is more closely segregated. He has lost the security of his own culture and is moving rapidly toward a middle class white culture. This period of uncertainty and close segregation parallels the increase in the rate of Negroes admitted to the state hospitals, especially for schizophrenia.

"It seems to us most reasonable to believe," the scientists declare, "that the preponderance of mental disease in the Negro over the white man and its increase in ratio to Negro population in Virginia is due to segregation and to the period of uncertainty accompanying culture change."

Science News Letter, August 3, 1957

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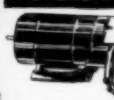

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4.—Length 19-1/2" — extends to 22-1/2"
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10.—2-Piece Hardwood Tripod. Only 30" long folded but extends to 4-1/2 ft.
11.—Fitted Hardwood Case for all parts.

FREE BOOK ON STARS – Tells you all about the stars and the constellations – Where to find them at different times – How to identify them and many other intriguing facts on astronomy.

EXTRA 100X EYEPIECE 7.50 125X EYEPIECE 9.95

83 and 40 POWER ASTRONOMICAL SCOPE

Very similar to scope above but has 83X & 40X eyepieces with a 40MM objective lens. Also has a variable eyepiece of 25–30X. Steel tube body is 26" long. Included with scope is sunglass, a pair of prisms (1 erecting), a hardwood tripod and a fitted case.

Only 39.95

25 POWER x 30 MM TELESCOPE & TRIPOD

Nowhere but at PALLEY'S can you find a buy like this! Here's a scope, complete with a sturdy metal tripod, that you can have a lot of fun with. Use it to spot hits on the target, for star-gazing, interesting views at the beach, etc. Made of aluminum and chrome plated brass. Field 62 ft. at 1000 yds. 1-3/16" dia. lens.

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The items shown here are but a small sampling of the thousands of items in our NEW CATALOG (at the top of this ad). You will find many more bargains in Microscopes, Motors, Hobby & Precision Tools, etc. Order your copy NOW.

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PERISCOPE PRISM

Made of finest optical glass. Bends light rays 90 degrees. Can be adapted to lens, lights, etc. Size 5"x 1". With mirror reflector – 59¢ Pure Prism, without mirror – 2.25

GUN CAMERA ERECTING PRISM

Permits camera to be mounted parallel to the focal plane. Image is turned 90° by two first surface mirrors set at 45° angles. Mirrors and operature lens are finest optical glass. Made by Bell & Howell.

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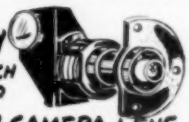

GUN CAMERA LENS ASSEMBLY-GOV'T COST $75

For same purpose as item above. This assembly consists of the camera lens as well as the erector unit. Lens is made by Eastman. 3-inch focal length (16mm telephoto) with speed of f-3.5. Erector assembly has 2 first surface mirrors and yellow filter. 9.95

EXACTOR HYDRAULIC REMOTE CONTROL

MASTER & SLAVE

Consists of two units. Designed to operate controls on boats, machinery, engines, motors, etc. without need for rods, cables, pulleys, etc. When connected with ¼" tubing & filled with oil they act as a precision, remote controller. When Master handle is moved, Slave arm responds in exact motion. Range is 0 to 90 degrees. Combination Master & Slave for USED 27.50

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JET CHARGER maintains a constant air cushion in pressure tanks. Designed to eliminate water-logging in water pumps, the charger has a butyrate plastic non-rusting body. It can be used with centrifugal, rotary, gear, deep and shallow well jet or turbine pumps.

Science News Letter, August 3, 1957

BOOK PHOTOCOPIER has an exposer and printer in a single unit. A sponge rubber cushioned head adjusts to the thickness of any book. The machine is designed for copy work up to 8½ by 14 inches and will pick up print, signatures from ball-point or fountain pens, crayons, colored pencils and spirit duplications.

Science News Letter, August 3, 1957

OUTDOOR LIGHTS for cold weather are 400-watt mercury lamps designed to withstand the shock of exposure to cold water and snow when lighted. Made in five models, the lamps are equipped with the regular mogul base. They can be used in open-type fixtures at gas stations, parking lots and backyards.

Science News Letter, August 3, 1957

INFLATABLE SPORTS CAR for junior to buzz around in at the lake this summer is made of a plastic vinyl film. Complete with a built-in horn noisemaker and simulated wheels, the float shown in the photograph is almost two feet long when blown up. It has a self-adjusting split tail.

Science News Letter, August 3, 1957

DUAL PURPOSE CABLE can be used to transmit communications and to hoist at the same time. The wire rope has a center core of copper wire conductors imbedded in a fiber core that is "laid-up" in a steel wire rope. It is available in 11 rope diameters from three-quarters of an inch to two inches.

Science News Letter, August 3, 1957

SHAVING ATTACHMENT plugs into the wall outlet and changes alternating current into direct current. Said to increase the efficiency of AC/DC electric shavers, thereby giving a cleaner, faster shave, the device can be used with new or old electric razors.

Science News Letter, August 3, 1957

TINY RADIATION DETECTOR is designed to be used as a home survey meter for emergency conditions. Weighing two ounces and measuring two by one and one-quarter by one inches, the detector is said to be weatherproof, fungusproof, shockproof and non-breakable. With no tubes or batteries, the inexpensive meter can be stored for use at any time.

Science News Letter, August 3, 1957

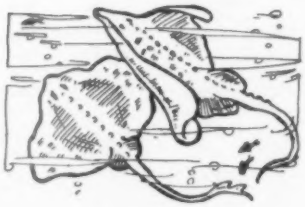
PORTABLE DRAWING BOARD made of plastic measures 10 by 12 inches and can fit into a brief case. Molded of polystyrene, the board comes with two plastic triangles. Spring clips hold the paper and rubber cushions protect a desk-top. The portable board weighs less than eight ounces.

Science News Letter, August 3, 1957

Nature Ramblings

By HORACE LOFTIN

Little Men and Big Fish



➤ YOU DO NOT have to be rich and retired to be a big game fisherman. The kids along the North Carolina coast go big game fishing every summer day, using equipment costing about 50 cents. Their catch is made up of skates and stingrays, and some of the rays weigh 75 pounds or more.

The "tackle" consists of about 100 feet of strong marlin line, a shark hook with a wire or chain leader and a hunk of old iron from a sinker. Bait is a piece of scrap fish usually donated by the local fish house.

Each young fisherman has his favorite dock for fishing. First he ties the free end of his line to a sturdy piling, then baits the hook and heaves the weighted end as far out as he can. When the bait has settled to the bottom, the slack is taken in and the line held tautly.

Usually it takes no more than 15 minutes for the bottom-browsing ray to find the bait. He makes his presence known first as he gently nuzzles the fish; the fisherboy learns of this as the line alternately tightens and slackens in his hand.

Then it happens! The ray picks up the bait and slowly swims away with it. The boy gives a sharp jerk on the line and the fight is on. Nothing but the sturdy piling stops the ray on his first mighty rush. All 100 feet of line is stretched out, cutting through the water as the ray whips back and forth.

After a while the ray settles to the bottom where he digs in, his great flattened body acting as a suction cup. Now the young fisherman has to pull with all his might to take in line. He may gain a few feet, when all of a sudden the stingray makes another great rush. But with each rush the ray tires and the fisherman wins more line, until finally he has the ray at the dock.

At this point, the elated fisherman usually has to call for help, for 75 pounds of stingray is too much for a 12-year-old to lift onto the dock.

The young fisherman's great prize is the sharp, jagged barb which he cuts from the base of the stingray's tail. No Miami sportsman can be as proud of his mounted sailfish as is this kid with his stingray's "stinger"!

Science News Letter, August 3, 1957